DEREK W. BAILEY · TRUE PHOTONIC

The Light Ladder

Every week a new headline says light is about to change computing. Most of them are true, and most of them are about a different thing. There is good work on every rung, and accelerators and interconnect are big business. Here are the three kinds of light in computing, and how to tell which one you're reading about.

3

LOGIC · LIGHT MAKES THE DECISIONS

The ones and zeros are light, and the decisions are made in light.

The computing itself happens in light. No transistor has to be pushed with current to make each decision, so the heat that drives the power bill and the cooling bill goes away at the source.

On this rung: True Photonic, Logic-in-Light, built around the Poovey Switch.

2

ACCELERATOR · LIGHT AS THE HELPER

Light does one specialist job. The logic still lives in the transistor.

Light speeds up a particular kind of math, often the multiplying inside AI, then hands the answer back to electronics. The decisions, the memory, and the control still run on transistors, so the current and the heat stay.

On this rung: Lightmatter Envise, LightSolver, Q.ANT, Lumai. Typical headline: "optical chip runs AI 100 times faster" or "light-powered AI."

1

INTERCONNECT · LIGHT AS THE WIRE

Light moves data between chips, racks, and buildings.

Fiber and optical links carry bits faster and farther than copper. It is real, valuable, and already a huge business. The bits are turned back into electrons at each end, and every decision is still made by a transistor.

On this rung: Marvell and Lumentum, Ayar Labs, Celestial AI, Lightmatter Passage, Volantis. Typical headline: billion-dollar optical networking deals, co-packaged optics, faster links inside data centers.

The three-question test for any headline

1. **Where are the ones and zeros made?** In light, or in a transistor?
2. **Where is the decision made?** If light does the work and then hands the answer to electronics, it's rung 2.
3. **What is light actually doing?** If it's carrying data from one place to another, it's rung 1, however big the deal.

Why the rung matters

Today's computers trade electricity for logic. Rungs 1 and 2 make that trade faster and cheaper to move around, and that is worth a lot of money. Only rung 3 changes the trade itself. That is where the electric bill, the water, and the cost of AI change at the source.

Keep reading on Substack: **derekwbailey.substack.com** · Contact: dbailey@truephotonic.com

Derek W. Bailey is the Founder of True Photonic, Inc. and author of *Keep Computing: How Light Solves Computing's Impossible Problem* (2026). TPI is developing the Logic-in-Light™ architecture centered on the Poovey Switch, validated at 150–200 femtoseconds at the Technion Israel Institute of Technology.

Disclosure: The author has a financial interest in the success of photonic computing technology. Performance projections are based on preliminary research, early-stage testing, and technical simulations. Actual results may vary.

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